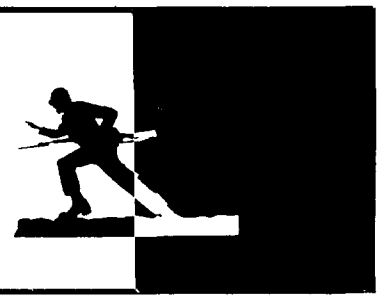
PROFESSIONAL FORUM



Using Devices
To Predict Live Fire Marksmanship

JOSEPH D. HAGMAN

In these times of shrinking resources, marksmanship trainers are often under pressure to do more with less when training soldiers to become—and remain—proficient shooters. The guidance is out there, but constraints in time, ammunition, and range availability often force compromises.

Given this situation, would you be interested in a tool that will make your job a little easier by helping you do things with training devices that you've never been able to do before? We at the Army Research Institute (ARI) field office in Boise, Idaho, have developed just such a tool and designed it to help you make the most of the device-based portion of your rifle marksmanship training program, whether it is geared for initial or sustainment training. As you read on, you'll find out exactly what the tool is, how it works, and what it can do for you.

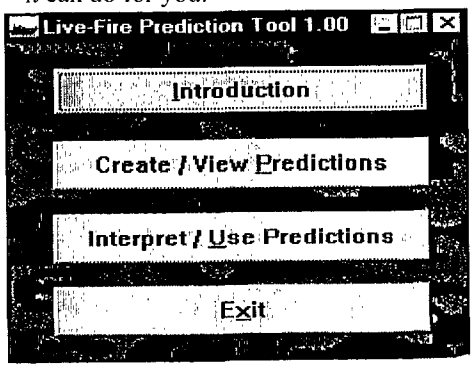


Figure 1. The Prediction Tool main menu.

The tool is a floppy-disc-based software program, designed to run in a Windows 3.1/95/98 environment. It uses the calculated relationship between device-based and live-fire-based marksmanship performance to predict how well soldiers will shoot on the range. The tool can calculate these predictions for any live-fire evaluation event (such as record fire qualification) that can be simulated on a training device—the Multipurpose Arcade Combat Simulator (MACS), for example—provided the same scoring procedure is applied to each, and the relation between the two sets of scores is good enough to support accurate predictions. When you enter the device and live-fire scores and click the button, the tool automatically performs the statistical analyses needed for calculating the predictions; then it saves the results of your work for future reference.

The steps you will need to create, view, interpret, and use the tool's predictions are listed under the main menu options shown in Figure 1. You simply click on the desired option to enter, or obtain, the information requested. It's that easy.

Clicking on the "Introduction" button gives you guidance on what kind of device and live-fire data will need to be collected and then entered; tips on how these data should be collected for best results; and helpful hints on how to navigate successfully through the program.

Clicking on the "Create/View" button will lead you to the "Prediction Log"

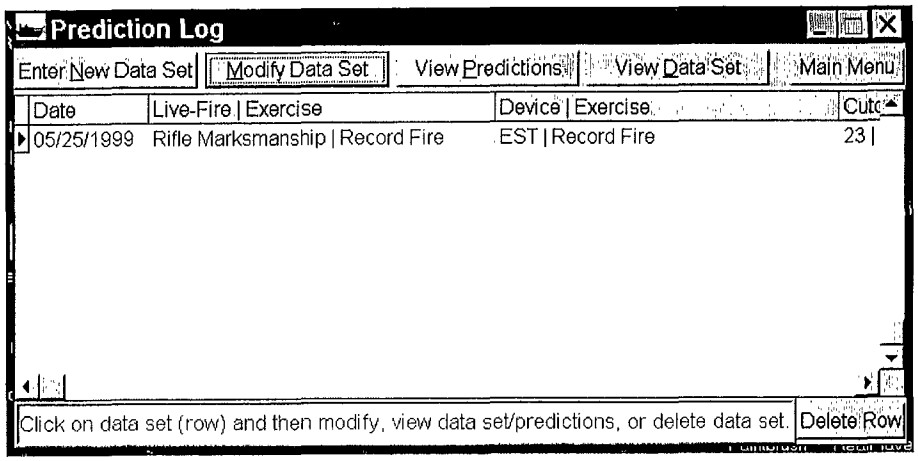


Figure 2. The Prediction Log screen.

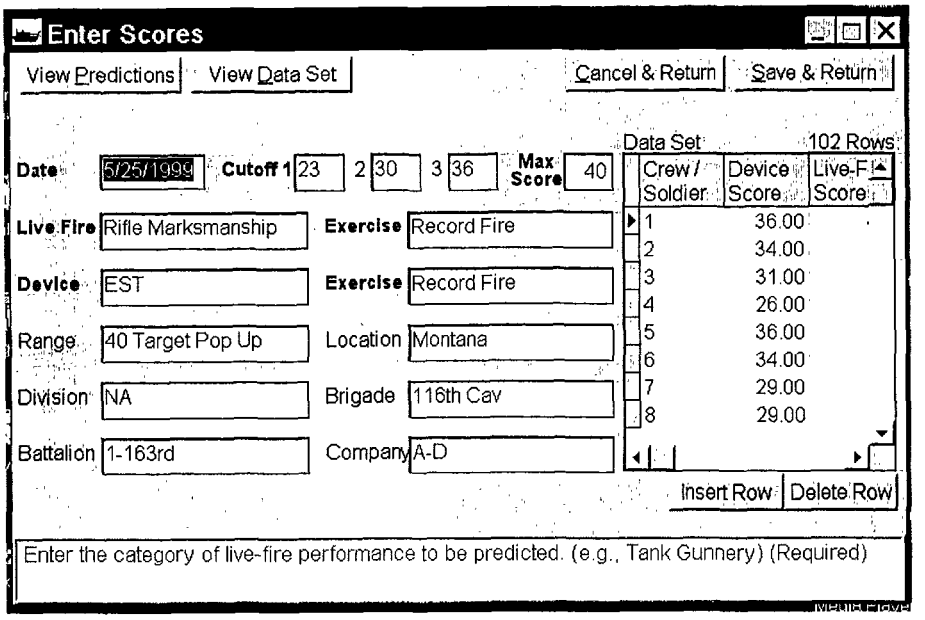


Figure 3. The "Enter Scores" screen.

Date: x/xx/xx
Range: 40-target pop up
Location: Montana

Division: N/A
Brigade: 116th Cav
Battalion: 1-163rd
Company: A-D

PREDICTED RANGE RECORD FIRE SCORES FROM DEVICE (EST) RECORD FIRE SCORES

DEVICE SCORE	PREDICTED AVERAGE RECORD FIRE SCORE	PROBABILITY (%) OF RECORD FIRE SCORE ≥23	≥30	≥36
1	19	10	--	--
3	20	20	--	--
5	21	30	--	--
7	22	40	--	--
9	23	50	--	--
10	24	60	--	--
12	25	70	--	--
13	26	--	10	--
14	26	80	--	--
16	27	--	20	--
17	27	--	90	--
18	28	--	30	--
20	29	--	40	--
21	30	--	50	--
23	31	--	60	--
24	32	--	70	10
26	33	--	80	--
27	33	--	--	20
29	34	--	90	30
30	35	--	--	40
32	36	--	--	50
33	37	--	--	60
35	38	--	--	70
38	39	--	--	80

Figure 4. Sample Prediction Table

screen, shown in Figure 2, where the results of your work will eventually be stored for permanent access.

Clicking on the "Enter New Data Set" button on the "Prediction Log" screen (Figure 3), where the device and live-fire data collected earlier are to be entered, along with information needed to identify your data set. This information includes the category of live fire to be predicted (for example, rifle marksmanship), the specific live-fire exercise or event scores to be predicted (record fire qualification), the training device to be used for prediction (MACS), the specific device exercise scores from which predictions will be based (scores obtained on a simulated record fire exercise), the cutoff scores against which predictions will be calculated (e.g., the minimum scores of 23, 30, and 36 for Marksman, Sharpshooter, and Expert rating levels, respectively), the maximum possible live-fire score obtainable (e.g., 40 hits), and specific unit/range information to help you keep track of where and from whom the data were collected.

Once you've entered the requested information, clicking on the "View Predictions" button sets the program into action and presents you with the resulting predictions. They will be displayed in table format like the one shown in Figure 4. Column 1 will contain a range of device scores; Column 2, the predicted average live-fire score for each device-score listed; and Columns 3–5, the predicted chances of firing at or above the live-fire cutoff scores that you entered earlier (that is, 23, 30, and 36).

Lastly, clicking on the main menu's "Interpret/Use Predictions" button will give you guidance on how to do that for the predictions provided. For instance, using the sample prediction table that we derived from a reserve component unit's scores fired on the Project SIMITAR's (Simulations in Training for Advanced Readiness) version of the Engagement Skills Trainer (EST), it would be predicted that a soldier with an EST score of 17 would, on the average, fire 27 on the live-fire range and have a 90 percent chance of successful record-fire qualification at the Marksman level, and a 20–30 percent chance of qualifying Sharpshooter level. A soldier with an EST score of 26 will fire 33 on average and have more than a 90 percent chance of qualifying Marksman, an 80 percent chance of qualifying Sharpshooter, and a 20–30 percent chance of qualifying Expert, and so forth. To show the tool's flexibility, we've also used it to derive analogous predictions of Tank Table VIII scores from Conduct-of-Fire Trainer (COFT) scores in support of the RC armor community.

Device and live-fire data collected earlier are to be entered along with information needed to identify your data set.

So what can the tool do for you? For starters, you can predict soldier record fire performance *on your range* from scores fired *on your devices.* Second,

by using the tool for pretesting, you can schedule device-based training more efficiently by targeting only the crews in need of remediation (those who do not meet the device-based live-fire expectancy standard set by your unit commander—for example, 80 percent probability of qualification at the Marksman level). Third, by using the tool for post-testing, you can determine exactly when your crews have received enough initial or sustainment training (when they have met this expectancy standard). Fourth, you can save ammunition for other purposes by allowing only the soldiers who are ready for successful qualification to fire on the range. And lastly, having such a tool will enable you to substitute device-based qualification for live-fire-based qualification when ranges are not readily available. Of course, shooting record fire on a device instead of a range is still a controversial notion, but if and when the time comes for its acceptance, you'll have the tool to make it work.

To request a copy of the prediction tool software, contact Dr. Joseph D. Hagman, U.S. Army Research Institute, Reserve Component Training Research Unit, 1910 University Drive, Boise, ID 83725; commercial telephone 208-334-9390; fax 208-334-9394; e-mail address hagman@ari.army.mil.

The tool can also be downloaded from the ARI website at www-ari.army.mil. Once at the website, click on "Products," then on "Recently Completed ARI Products," then on "Predicting Live-Fire Performance," and follow the downloading instructions presented there.

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